

ABSTRACT OF THE DISCLOSURE

An input-side rectifier (4), a smoothing capacitor (6), an inverter (8), a transformer (10) and an output-side rectifier (12) operate together to convert an AC voltage supplied from an AC power supply to a DC voltage. The DC voltage is coupled through a DC-to-AC converter (16) to a workpiece (18) and a torch (20). An auxiliary voltage supply (28) supplies the workpiece (18) and the torch (20) with a negative voltage for a short time following the transition of the AC voltage supplied to the workpiece (18) and the torch (20) from positive to negative. The negative voltage has a negative peak value larger than the negative peak value of the AC voltage supplied to the workpiece (18) and the torch (20), and rapidly changes from the negative peak value. The auxiliary voltage supply (28) produces a DC voltage having a negative peak value larger than the negative peak value of the AC voltage supplied to the workpiece (18) and the torch (20), by means of a transformer (30), a rectifier (32) and a smoothing capacitor (36). The smoothing capacitor (36) is coupled to the workpiece (18) and the torch (20) through a transistor (38) and a current-limiting resistor (40). A differentiating circuit (46) is coupled in parallel with the current-limiting resistor (40), and includes a resistor (48) having a smaller resistance value than the current-limiting resistor (40).